

The following Listing of Claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A method for estimating DC motor coil temperature in a motor driving system in which an output of an inverter is supplied to a DC motor, comprising:
~~steps of;~~
calculating a resistance of ~~the a~~ coil of the DC motor by using a motor current and a motor voltage, and
estimating a coil temperature by using resistance-temperature characteristics of the coil of the DC motor.
2. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in claim 1, ~~comprising the step of wherein~~
~~the calculating of the [[a]]~~ resistance of the coil of the [[a]] DC motor includes by using a duty difference and a current difference by using a plurality of ~~duties, instead the~~ calculating step duty ratios.
3. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in claim 1, further comprising or claim 2, wherein
~~employing a the motor driving system employs~~ fixed coordinate system and applying applies a voltage with an electrical angle determined to be a constant angle.
4. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in claim 2, further comprising wherein
~~maintaining the motor driving system maintains~~ a constant duty for equal to or greater than at least 0.5 seconds.

5. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 4, further comprising wherein detecting the system detects a motor current by using a shunt resistor, and the calculating step calculates of the resistance of the coil of the DC motor is performed by calculating a coil resistance at a carrier frequency lower than that for driving the DC motor driving.

6. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in one of claim 1, further comprising to claim 5, wherein providing the DC motor within is provided in an interior of a casing of a compressor [[,]] for driving the compressor.

7. (Currently Amended) A DC motor control method using the method as set forth in claim 1 for estimating the DC motor coil temperature and comprising the steps of; estimating a coil temperature by using one of the methods of claim 1 to claim 6, and setting a DC motor temperature to be a predetermined temperature based upon the estimated coil temperature that was estimated.

8. (Currently Amended) A DC motor control method using the method as set forth in claim 1 for estimating the DC motor coil temperature and comprising the steps of; estimating a coil temperature by using one of the methods of claim 1 to claim 6, and setting a time interval till until starting of [[a]] the DC motor based upon the estimated coil temperature that was estimated.

9. (Currently Amended) A DC motor control method using the method as set forth in claim 1 for estimating the DC motor coil temperature and comprising the steps of; estimating a coil temperature by using one of the methods of claim 1 to claim 6, and setting a driving and controlling method for [[a]] the DC motor based upon the estimated coil temperature that was estimated.

10. (Currently Amended) A device for estimating DC motor coil temperature comprising: [[:]]

~~motor driving system in which an output of an inverter that supplies an output is supplied to a DC motor; and, wherein the system comprises~~

~~a coil temperature estimating section means which comprise comprising a resistance value calculating section configured to calculate means for calculating a resistance of the a coil of the DC motor by using a motor current and a motor voltage, and a temperature output section configured to output means for estimating an estimated coil temperature by using a the resistance-temperature characteristics of the coil of the DC motor.~~

11. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in claim 10, wherein

~~the coil temperature estimating means resistance value calculating section is further configured to calculate [[a]] the resistance of the coil of [[a]] the DC motor by using a duty difference and a current difference by using a plurality of duties duty ratios.~~

12. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in claim 10 or claim 11, wherein

~~the coil temperature estimating means section is further configured to employ a fixed coordinate system and apply a voltage with an electrical angle determined to be a constant angle.~~

13. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in claim 11, wherein

~~the coil temperature estimating means section further includes a constant duty maintaining section that is configured to maintain a constant duty for equal to or greater than at least 0.5 seconds.~~

14. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 13, wherein

~~the coil temperature estimating means section is further configured to detect a motor current by using a shunt resistor, and calculate a coil resistance at a carrier frequency lower than that for driving the DC motor driving.~~

15. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 14, wherein

~~the DC motor is provided within an interior of a casing of a compressor [[,]] for driving the compressor.~~

16. (Currently Amended) A DC motor control device using the device as set forth in claim 10 for estimating the DC motor coil temperature and comprising [[;]]

~~means for estimating a coil temperature by using one of the devices of claim 10 to claim 15, and~~

~~a control section configured to set means for setting a DC motor temperature to be a predetermined temperature based upon the estimated coil temperature.~~

17. (Currently Amended) A DC motor control device using the device as set forth in claim 10 for estimating the DC motor coil temperature and comprising [[;]]

~~means for estimating a coil temperature by using one of the devices of claim 10 to claim 15, and~~

~~a control section configured to set means for setting a time interval till until starting of [[a]] the DC motor based upon the estimated coil temperature.~~

18. (Currently Amended) A DC motor control device using the device as set forth in claim 10 for estimating the DC motor coil temperature and comprising [[;]]

~~means for estimating a coil temperature by using one of the devices of claim 10 to claim 15, and~~

~~a control section configured to set a means for setting driving and controlling method for [[a]] the DC motor based upon the estimated coil temperature.~~

19. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 6, wherein the calculating step calculates a resistance of a coil by of the resistance of the coil of the DC motor includes compensating for a voltage drop due to transistors and diodes included in the an inverter.

20. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in claim 1, further comprising the step of carrying out compensation based upon a resistance value of power wirings when [[a]] the coil temperature is estimated by using a value obtained through calibration.

21. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in claim 19, further comprising the step of detecting a rotor position of [[a]] the DC motor, calculating an inductance from the detected rotor position that was detected, and compensating [[a]] the coil temperature calculated from [[a]] the resistance of [[a]] the coil, in correspondence with the calculated inductance that was calculated.

22. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 6, wherein the detection of the motor current is detected carried out at a central timing of an ON-time or an OFF-time.

23. (Currently Amended) The [[A]] method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 6, wherein the detection of the motor current is detected carried out under a condition that a predetermined voltage is output by using a PAM circuitry.

24. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 15, wherein

the coil temperature estimating means section is further configured to calculate [[a]] the resistance of [[a]] the coil by compensating voltage drops due to transistors and diodes included in an the inverter, and estimate [[a]] the temperature of the coil from the resistance of the coil.

25. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in claim 10, wherein

the coil temperature estimating means section is further configured to carry out compensation based upon a resistance value of power wirings when [[a]] the estimated coil temperature is estimated by using a value obtained through calibration.

26. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in claim 10, wherein

the coil temperature estimating means section is further configured to detect a rotor position of [[a]] the DC motor, calculate an inductance from the detected rotor position that was detected, and compensate [[a]] the coil temperature calculated from [[a]] the resistance of [[a]] the coil, in correspondence with the calculated inductance that was calculated.

27. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 15, wherein

the coil temperature estimating means section is further configured to detect the motor current at a central timing of an ON-time or an OFF-time.

28. (Currently Amended) The [[A]] device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 15, wherein

the coil temperature estimating means section is further configured to detect the motor current under a condition that a predetermined voltage is output by using a PAM circuitry.